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INNOVATION COMMITTEE FINAL REPORT

This project has received funding from the EU H2020 research and innovation programme under Grant Agreement No 824077

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SUMMARY

Innovation is a key-concept of the EUROFLEETS+ project. Therefore, Innovation management has been assigned a dedicated work package to ensure a high level of industrial collaboration in the project, sound innovation management practices, and appropriate identification and management of exploitable results to increase the impact of Eurofleets+.

This report presents the achievements of the Innovation Committee and of the Industry Platform throughout the duration of the Eurofleets+ project.

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1. Introduction

The overall aim of work package 7 is to ensure a high level of industrial collaboration in the project, sound innovation management practices, and appropriate identification and management of exploitable results to increase the project impact. Altogether the beneficiaries participating in work package 7 form the "Innovation Committee":

- Royal Belgian Institute of Natural Sciences
- Marine Institute
- Maris*
- National Research Council of Italy (CNR)
- Universidat de Girona
- Coronis Computing*
- Blue Lobster IT*
- VoyagerIP*
- Seaonics*
- Hampidjan*
- Iqua Robotics*
- MacArtney*

The Committee and the Platform work together to achieve the objective of the work package, namely:

1. *To ensure that project participants understand the exploitation strategy and plan, and innovation management procedures, based on principles agreed in the Eurofleets+ Consortium Agreement.*
2. *To provide guidelines and support to user groups and researchers on innovation management and exploitation, for funded transnational or virtual access activities.*
3. *To implement best practice innovation management and exploitation processes in all stages of the project, and to capture and manage relevant project results.*
4. *To develop an exploitation roadmap to ensure that commercial and non-commercial results will increase the medium and long-term impact of the project and maximise opportunities for future exploitation.*

Fortunately, the COVID pandemic has had a rather limited influence on the work of the Innovation Committee, except for the activities that were tributary of the funded cruises and where originally face–to–face meetings or participation to events were foreseen.

2. Formal activities

The Innovation Committee has been formally established during a meeting that took place on March 6th, 2019, immediately following the Eurofleets+ Kick-Off meeting. The "Industry Platform", comprised of all the companies participating in the Eurofleets+ project (marked with a "*" above), was also

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established. Colm Mulcahy (VoyagerIP) agreed to chair that group. After Colm stepped down (September 2022), Joseta Roca (IQUA Robotics) was appointed as chair of the Industry Platform. It was agreed that the other beneficiaries of this work package were accepted as observers during the meetings of the Industrial Platform.

The Innovation Committee and the Industry Platform have met several times during the project:

- On March 6th, 2019 (Back to back with Eurofleets+ Kick-Off meeting).
- On March 3rd, 2020 (Back to back with Eurofleets+ 1st General Assembly).
- On December 2nd, 2020 (virtual *ad hoc* meeting).
- On March 4th, 2021 (Back to back with Eurofleets+ 2nd General Assembly, virtual).
- On September 20th, 2021 (Joint WP5, WP7 and WP8 meeting, virtual)
- On March 24th, 2022 (Back to back with Eurofleets+ 3rd General Assembly, virtual)
- On November 3rd, 2022 (virtual *ad hoc* meeting).
- On November 15th, 2022 (Back to back with Eurofleets+ 4th General Assembly, Barcelona, Spain)
- On February 15th, 2023 (virtual *ad hoc* meeting).

3. Deliverable 7.1 Exploitation and Innovation Plan

As part of Task 7.1, an Exploitation and Innovation plan has been drafted and delivered in May 2019. It sets the framework for managing innovation in Eurofleets+. It addresses both the results of the Joint Research Activities and innovation perspectives of the projects accepted for transnational access grants.

Table 1: Table of contents of Deliverable 7.1.

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4. Deliverable 7.2 Exploitation and Innovation guidelines for user groups

The Innovation Committee is required to pay particular attention to the innovation perspectives of the projects selected for transnational access funding. It therefore drafted, and delivered in July 2020, a guidance manual for the PIs.

This document introduces some basic concepts and tools for the valorisation of the R&D outcomes of the funded cruises. Additional emphasis was placed on the approaches to manage innovation and to develop business models ("Innovation Canvas" and "Business Model Canvas"). As there are many situations and different possible results to exploit, it was recommended that PIs establish a dialogue as soon as possible with the Innovation Committee, thus ensuring that the most appropriate steps for valorising the innovative results of their research are undertaken.

Table 2: Table of contents of Deliverable 7.2.

5. Interactions with external industry representatives and other interested parties

A workshop to interact with various categories of stakeholder was originally planned to take place in 2020. Due to the pandemic, this workshop was replaced by a survey managed by work package 5 (EMSO and CNR), in which two questions relating to innovation were considered:

1. Do you feel that there is close collaboration between researchers and industry & technology developers in developing new products and solutions (e.g., solving problems for RV operators to increase RV capability and/or for users to optimize acquisition techniques)?

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2. In which areas do you feel the collaboration between Researchers and industry & technology developers is most important?

Analysis of the results highlighted that the panel (34 participants) was indeed diverse (Figures 1 and 2).

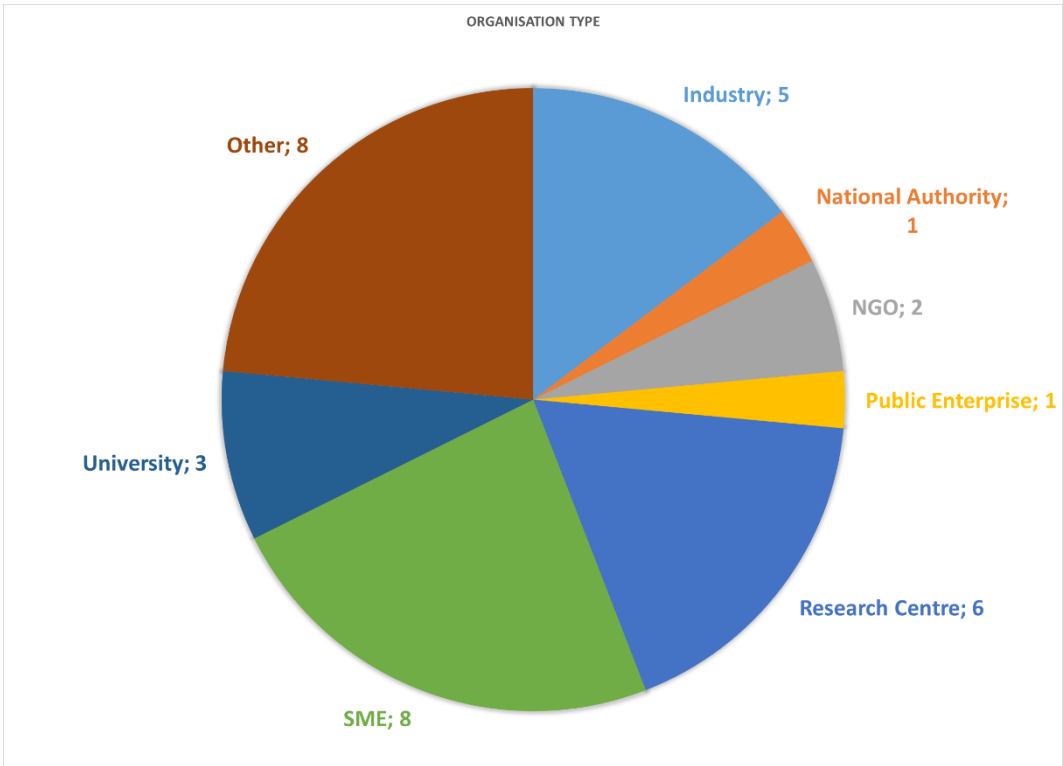

Figure 1: Repartition by type of organization of the respondents to the stakeholder survey.

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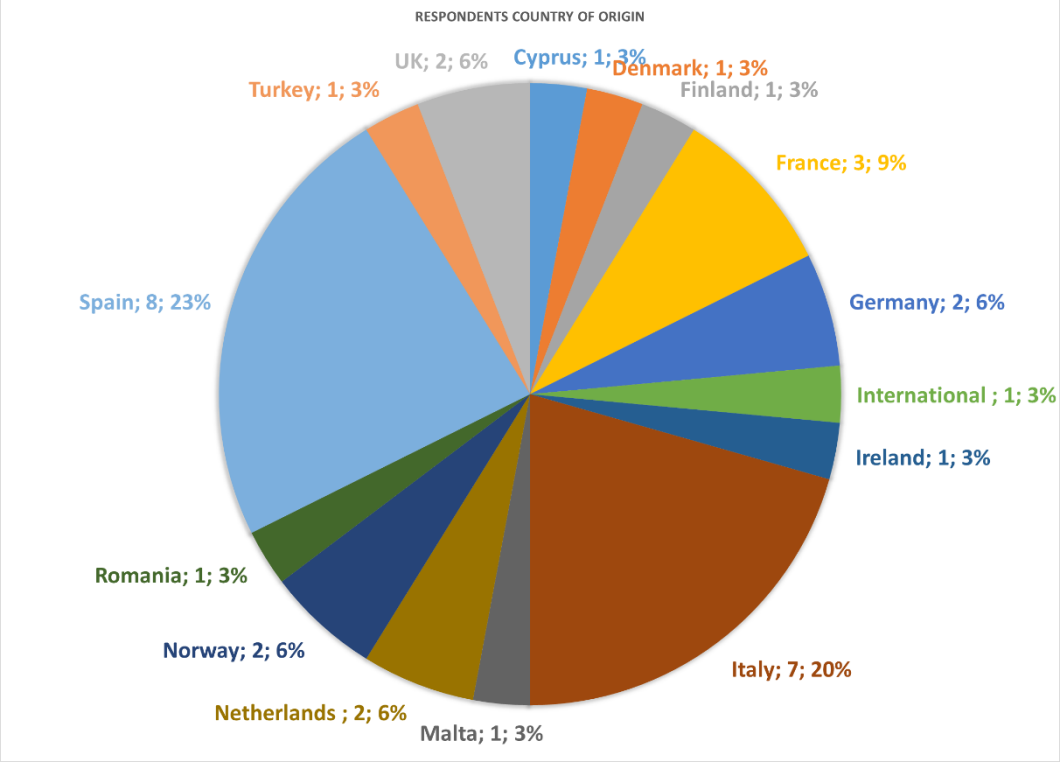

Figure 2: Country of origin of the respondents to the stakeholder survey.

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The answers to the first question show that there is a rather positive feeling that there is a close collaboration between researchers and industry & technology developers, although this feeling seems to be more developed among the community of researchers (Figure 3).

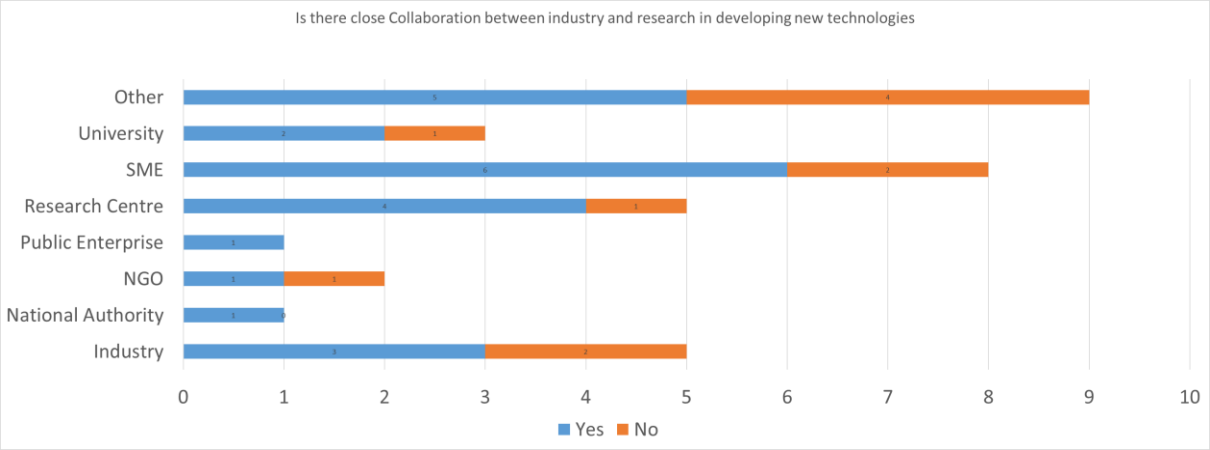

Figure 3: Answers to the 1st question "Is there a close collaboration between industry in research in developing new technologies?"

In reply to the 2nd question, several specific domains have been cited (Figure 4) but also some more general ("Deep sea exploration", "Biotechnology", "Hydrography", "Oceanography", "Climate change", "Natural hazards").

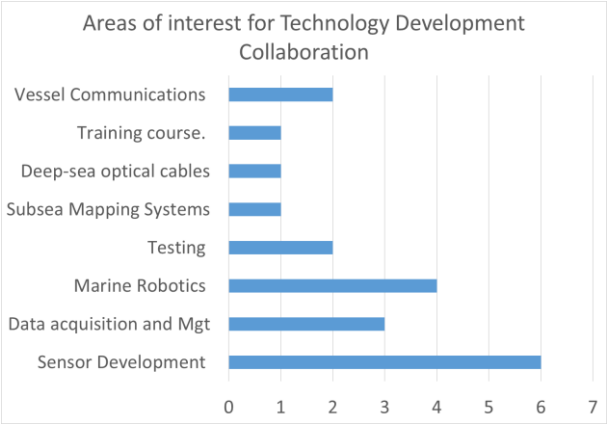

Figure 4: Answers to the 2nd question "What are the areas of interest for collaboration?"

The information gathered during this survey will assist in orientating the future direction and focus of the work of the Innovation Committee in collaboration with work package 5.

6. Deliverable 7.3 Industry Platform Report on Market Needs and Innovation Potential

There is an opportunity for Research and industry to bridge the gap between a better understanding of the needs of Scientists and the capability of Research Vessel's (RV's), testing of equipment, standardisation of specific parameters to facilitate interoperability and the training needs for crew

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and scientists. Additionally, the European RV fleet needs are evolving as with the expansion into deep sea and polar waters over the last decade.

The Industry Platform was in charge of drafting a report providing an analysis of market needs and innovation potential, by linking market needs with industry partners. To achieve this the Innovation Committee was tasked with crafting a strategy that would enable industry partners to 'connect' and communicate with frontline vessel operators and researchers. The purpose of the 'connection' is to exchange ideas, identify on board challenges and needs, and provide product and service innovations that can address these market challenges and needs.

Through various channels such as questionnaires, surveys and a workshop the Industry Platform has engaged the Eurofleets community through seeking opportunities within the project for co-design and co-development of new technologies sensors, equipment and software solutions.

The strategy was split into two tasks:

Task No. 1 Identify Innovation initiatives

Identify Innovation initiatives and help in highlighting innovation and technology to Industry, researchers, and technology developers (stakeholders).

Task No. 2 Establish market needs within the Eurofleets Vessel Operator community

Establish market needs within the Eurofleets community and seek opportunities for the co design and co development of new technologies.

Actions required to identify these Market needs included:

- Determining where stakeholder challenges exist and what they are.
- Identifying where Innovation exists in industry that addresses these challenges .
- Establish a platform for discussion that evaluates these challenges.

A plan for a collaboration and communication strategy where Industry representatives demonstrate how existing/new technology can resolve the challenges was developed. The proposal was to implement a Webinar event incorporating a 'Live On Line poll' via the Teams infrastructure. The European Research Vessel Operators (ERVO) annual meeting (June 1st /2nd 2021) was identified as the ideal setting for industry to collaborate with vessel operators, researchers, and other stakeholders.

This Eurofleets+ Science Session successfully connected Industry Representatives to Vessel Operators and Researchers in meaningful exchanges, with open discussions taking place and opportunities for input from key stakeholders during the event and in follow up off line discussions.

4 presentations were given, addressing the Key areas of interest for collaboration: The EARS software, VSAT communications, deep-sea portable electric winch design and Moonpool. During the Outreach session 55 participants remained engaged with the webinar Outreach session. (63 participants at the peak) Of these participants up to 30% engaged with the On line poll. These participant responses provided key information further pinpointing what was important to the market and where the real challenges exist.

After this exercise the Industry Platform issued the following recommendations:

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1. The Eurofleets+ Industry Platform has now been established and will provide the structure for industry innovation in product and service development with the Eurofleets+ stakeholders. This platform has been identified as a key offering for the future Eurofleets RI, to act as Industry Liaison with organisations and Networks such as ERVO, International Research Ship Operators (IRSO) working closely with industry developing new technologies through JRA, RTA and consultation.
2. This will be achieved by keeping the community connected by providing regular updates to both industry and the market on both the requirements of the market and the innovations of industry while encouraging all to participate and present in both on line and off line events at conferences and exhibitions such as Oceanology, Sea Tech Week and Oceans. Additionally, regular Market and industry engagement in Surveys and information gathering will take place to highlight requirements and innovations.

7. Deliverable 7.5 The Eurofleets+ exploitation roadmap

This Deliverable has been submitted at the end of July 2022. It sets the basis for an Exploitation Plan of the outcomes of the Joint Research activities of Eurofleets+. It is also intended as a contribution to WP8 “Foresight: Legacy and Roadmap”.

As outlined in the Description of Work, the purpose of the exploitation plan is to ensure that the Eurofleets+ innovative results which could be developed into new products, processes or services are protected and exploited.

To gather the necessary information, a simple form was sent to the three JRA Sub-Task leaders (MARIS, CSIC and UdG) asking them to contact their activity partners, discuss their answers with them and, in return, provide us with the collected information.

The following eleven developments were assessed for:

- How their technological readiness level evolved during the project.
- The plans for future developments and/or exploitation
- Their Intellectual Property Rights status.

Reviewed developments:

1. JRA 31. EARS & EVIOR
2. JRA3.1 Virtual playground
3. New deep-sea winch design
4. Multipurpose crane/handling system for deep water operations
5. Moon-pool use for deployment and recovery of research tools
6. Online target recognition and view planning
7. Sea-floor classifier
8. Online 3D mapping
9. AUV-ASV cooperation (three different achievements)

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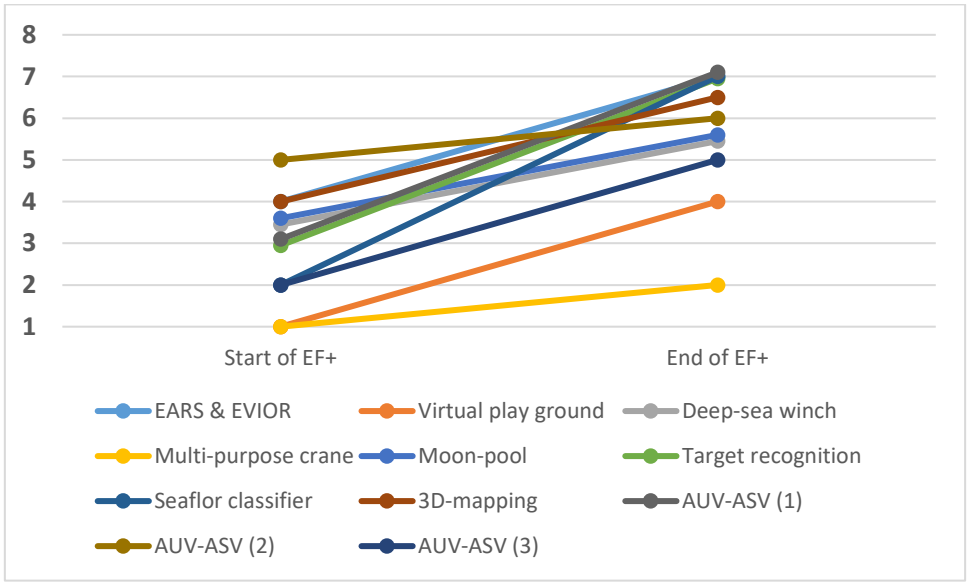
The survey provided detailed summaries describing the progress made thanks to Eurofleets+ for these key-developments (methodologies, software, tools…). All innovations/developments can be considered a success and demonstrate the important role of the Eurofleets community in improving existing tools or developing new ones, fit for deployment on research vessels or other high-technology oceanographic equipment.

TRL improvements

All developments generated an improvement of their TRL ranking. Five of the eleven are now at TRL 7 – system prototype demonstration in operational environment. The median of the increase of the TRL is of three levels. The most significant increase is for the Sea-floor classifier, that went from TRL 2 – technology concept formulated up to TRL 7 – system prototype demonstration in operational environment.



10.

11.

Plans for future developments and/or exploitation

Most of the respondents (ten out of eleven) clearly indicated their willingness to continue developing their methodologies, software or tools. Two are ready to continue with internal funding but most ask for external financial support. Two of these already managed to secure such a support through national funding mechanisms.

	Plans	**Funding**
Ears & EVIOR	Willingness to improve, based on the feedback of the users	Not mentioned

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	Plans	Funding
Virtual playground	Plans to invest in further development of the product that is considered as strategic	Internal funding or support from other projects
Deep-sea winch design	Plans to developed similar systems in the future	Needs for support and funding
Multi-purpose crane	No specific exploitation plan for the moment	Needs for support and funding
Moon-pool	Opportunities will be explored to design and build RVs with dual Mode deployment systems based on the concept design developed.	Industrial/commercial partnerships
Online target recognition	Willingness to develop a more generic system	Needs for external (EU) funding
Seafloor classifier	The research continues	Funded by national research project
Online 3D mapping	Willingness to continue the research	Needs for external (EU) funding
AUV-ASV cooperation (1)	A finalized version is in development	Internal funding?
AUV-ASV cooperation (2)	Funded by national research project Industrial/commercial partnerships	Funded by national research project Industrial/commercial partnerships
AUV-ASV cooperation (3)	Willingness to develop until reaching TRL 9	Internal funding. New features if external (EU) funding

IPR status

Most of the respondent adopt a very open approach. Algorithms are often described in scientific publications and there is a significant trend for adopted the (published) open source model for software. Sometimes, licensing is envisaged but in our opinion it is more a manner to remain

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informed of the use of the product or involved with new development. One team explicitly requests support for defining the most suitable licensing scheme for their software. This should be part of the final review by the Innovation Committee.

	Nature of the development	**IPR status**
Ears & EVIOR	Software	Still to be discussed amongst the partners. Request for legal assistance.
Virtual playground	Software	Published open source, although some parts might be licensed.
Deep-sea winch design	Conceptual design	Further development would be done under licence in partnership with Eurofleets RI if funding and support is available.
Multi-purpose crane	Conceptual design	No protection of intellectual property seems to be required.
Moon-pool	Conceptual design	No protection of intellectual property seems to be required.
Online target recognition	Algorithm, software	No protection of intellectual property seems to be required.
Seafloor classifier	Algorithm, software	No protection of intellectual property seems to be required. Results to be published in scientific journals.
Online 3D mapping	Algorithm, software	Possible licensing of the technology. Methodologies have been published in scientific journals
AUV-ASV cooperation (1)	Algorithm, software	The scheme of valorisation, through either commercial licensing or opensource sharing, has not yet been determined.
AUV-ASV cooperation (2)	Algorithm, software	No protection of intellectual property seems to be required.
AUV-ASV cooperation (3)	Algorithm, software	The software is protected by business secret and it is shared only under licence agreement, either in the

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	Nature of the development	IPR status
		framework of a customer contract or in a collaboration in a project. The code is strictly confidential.

It can be concluded that Impressive technological progresses occurred during the Eurofleets+ project. This is demonstrated by the number of new developments or improvement of existing methodologies, software and tools and the amplitude of the progresses, measured by the evolution of the Technological Readiness Levels.

All the partners show a strong willingness the keep developing their products but, most of the time, the lack of certitude concerning a financial support makes it difficult to draft a real exploitation roadmap.

8. Deliverable 7.6 Eurofleets+ Innovation Case Studies

Innovation is a key-concept of EUROFLEETS+. Therefore, Innovation management has been assigned a dedicated work package to ensure a high level of industrial collaboration in the project, sound innovation management practices, and appropriate identification and management of key exploitable results (KERs[1])to increase the impact of Eurofleets+, during and after the project.

The Key Exploitable Results (KERs) identified in the initial process to set up the Exploitation plan (D7.5) can be used to increase the impact of Eurofleets+, during and after the project. They can be used either by the project partners or by other stakeholders in the Eurofleets+ ecosystem and can take multiple shapes: reusable and exploitable entities (inventions, products, services) or elements (knowledge, technology, processes, networks) that have potential to contribute for further work, research or innovations. Deliverable 7.6 highlights the innovative aspects of the outcomes generated in the Joint Research Activities of Eurofleets+. It has been prepared in close collaboration with WP9 “Dissemination and Communication” to produce attractive “Fact Sheets” that can be either distributed in printed form at public events or as “slides” in presentations.

For this, the Industry Platform Chair (as per October 2020, Mrs Joseta Roca, IAQUArobotics) alongside with the Project Manager and the WP leader, has implemented a strategy to generate awareness of the KERs generated in the project, based in the following steps:

0) PRESENTING THE IDEA: A meeting with the Innovation Committee and the Industry Platform took place to agree on the next steps towards a wider dissemination of the KERs;
1) GATHERING DATA: a new questionnaire online (using Google Forms) requesting short answers in a plain language was design to gather all the necessary data to be able to complete the factsheets;

[1] Any tangible or intangible output of the action, such as data, knowledge and information whatever their form or nature, whether or not they can be protected.
http://ec.europa.eu/research/participants/portal/desktop/en/support/reference_terms.html

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2) QUESTIONNAIRE COMPLETION: the JRA partners with identified KERs were contacted to complete the new form, all the answers were completed in one week;
3) DATA PROCESSING: the answers were processed by the Industry Platform Chair and converted into a preliminary version of a slideshow which was presented in Eurofleets+ General Assembly in Barcelona (15th-16th of November 2022) by WP7 leader;
4) MAKING THE FINAL DESIGN: to make the factsheets more suitable as a communication tool, this slideshow was then integrated in an attractive template designed by Sandra Sá (WP9, Eurocean) that conveys structured "key messages" about the developed KERs:
    - Short description of the product
    - TRL level increase thanks to Eurofleets+
    - Goal
    - Motivation
    - Outcome
    - Value
    - Next Steps

The Partner is clearly identified, and the name and e-mail address of a contact person are also given:

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Currently a total of ten fact sheets has been produced:

- ✓ AUV-ASV COOPERATION USING AN ACOUSTIC MODEM / USBL SYSTEM
- ✓ SEAFLOOR CLASSIFIER
- ✓ UP-TO-SCALE 3D RECONSTRUCTION USING A MONOCULAR CAMERA SYSTEM
- ✓ VIRTUAL PLAYGROUND
- ✓ MULTIPURPOSE CRANE/HANDLING SYSTEM FOR DEEP WATER OPERATIONS
- ✓ DUAL MODE HANDLING SYSTEM
- ✓ ONLINE TARGET RECOGNITION
- ✓ DEEP-SEA WINCH SYSTEM
- ✓ SUBSEA NAVIGATION ALGORITHMS AND SOFTWARE
- ✓ AUTOMATIC REPORTING SYSTEM & EUROPEAN VIRTUAL INFRASTRUCTURE IN OCEAN RESEARCH

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9. Conclusion and next steps

During the Eurofleets+ project, the Innovation Committee and the Industry Platform have provided useful reference material, guidance and support to the many stakeholders: Principal Investigators, vessel operators, partners active in the R&D activities, …

The Eurofleets+ Industry Platform has proven to be an adequate and effective structure as a key offering for the future Eurofleets RI, to act as Industry Liaison with organisations and Networks such as ERVO, International Research Ship Operators (IRSO) working closely with industry developing new technologies through JRA, RTA and consultation.

As for further activities to follow in the case of the already mentioned KERs, the focus of the Innovation Committee to wrap up its tasks will be in understanding well the tools provided by the European Commission for the exploitation of the results such as the Horizon Results Platform.

Eurofleets+ team members have already shown interest in the tool and have attended info days in this regard to be able to inform about the potential of the tool to the WP7 participants. During the February 2023 meeting of the Innovation Committee this matter was discussed alongside with other potential measures for boosting Eurofleets+ KERs and reaching the widest audience possible, focusing on stakeholders in general and in industry in particular.

According to the description in the Innovation Case Studies, some of the partners may opt for further development of the technology in-house with self-funding, others will seek for further competitive funding to improve the TRL and there are others who have decided to use the technologies in existing products to increase their value.

The KERs owners have been informed about the possibilities of the Horizon Results Platform and the way in which the results can be uploaded, it will be up to the partners to decide whether to register their technologies or not depending on the development stage.

With regards to the further KERs that may arise from TNAs under development, the Project Coordinator will keep the information with regards to the Horizon Results Platform to disseminate it to them, in case it was of their interest.

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